

HOST INFLUENCE ON THE PROLIFICACY AND SIZE OF
TRICHOGRAMMA

S. E. FLANDERS

*University of California Citrus Experiment Station
Riverside, California*

It has been noted by workers engaged in the mass production of *Trichogramma* that *T. evanescens* is more prolific than is *T. embryophagus*. This seems to be the case when *Sitotroga cerealello* Oliv. is used as a host. On the other hand Peterson (1931) states that, when reared on bag worm eggs, *embryophagus* is four times as prolific as *evanescens*. Schread and Garman (1933) conclude that *evanescens* is more prolific than *embryophagus* because it produces twice as many females per male as *embryophagus*, other factors being equal. Peterson, on the other hand, suggests that *embryophagus* is more prolific than *evanescens* because of its longer life.

Recently the writer investigated the development and morphology of both species of *Trichogramma* when reared in the eggs of *Estigmene acraea* (Drury). The eggs of this moth are of medium size and permit the complete development of from 1 to 10 individuals per host egg.

Several hundred *Estigmene* eggs were exposed to parasitism for periods of 1 to 60 minutes. This was done by isolating each host egg in a gelatin capsule with a single female, then removing the females that had oviposited as well as those in the act of oviposition.

One hundred eggs parasitized by *evanescens* produced an average of 4.3 adults per egg. Thirty eggs parasitized by *embryophagus* produced 5.4 adults per egg. In each case the sex ratio was 2 females to 1 male.

If *embryophagus* tends to deposit more eggs per host than does *evanescens* and other conditions are equal, it is obvious that on small hosts, such as *Sitotroga* which permit the complete development of only one or two individuals, *embryophagus* would be much less prolific than *evanescens*; and on larger hosts, such as the eggs of the bag worm, it would tend to be more prolific than *evanescens*. This relationship may account for the conflicting observations of the authors noted above.

In *Estigmene* eggs, one *evanescens* female may deposit at least three eggs without withdrawal of the ovipositor. The progeny of a mated female from a single *Estigmene* egg normally consists of two females and one male. If an ovipositing female is removed from a host egg after only one egg is deposited, the solitary offspring is invariably a female.

Effect of the Number of Eggs Deposited by Mated *Trichogramma evanescens* in *Estigmene* Eggs on Sex of Progeny

Total number adults per egg.....	1	2	3	4	5	6	7	8	9	10
Number of eggs with females only....	12	7	2	5	2	1	..	..	..	..
Number of eggs with males and females .....	..	1	16	12	10	12	3	4	1	1

Solitary specimens from *Estigmene* eggs have a longer developmental period than do gregarious specimens. Presumably this is due to the necessity of the developing larvæ consuming an extraordinary amount of food in order that the interior of the host will be suitable for pupation. The abdomen of a solitary specimen is so enlarged that it emerges with great difficulty from the host. The head capsule and thorax reach their maximum size in such solitary specimens. This is indicated by the abnormal girth of the abdomen. The diameter of the exit aperture in the host, which is cut to permit the passage of the head and thorax, is too small to allow the abdomen to pass through readily. In some instances the parasite was unable to entirely emerge. This is particularly true of *evanescens*, which attains a maximum body length of 0.8 mm. The abdomen of *embryophagus* is somewhat narrower and the adults emerge with less difficulty. The maximum body length so far obtained in this species is 1 mm.

The eggs of *Estigmene* are uniform in size and content so that, if not superparasitized, the total mass of the parasites (1 to 10) developing in one egg is approximately equal to the total mass developing in another egg.

Large specimens of *Trichogramma* may be over five times as prolific as small specimens. A record of 200 parasitized *Sitotroga* eggs was obtained from one specimen of *evenescens*.

Under otherwise equal conditions, a difference in size of individual females results in their having different hosts. Large specimens of *Trichogramma* are able to oviposit in larger hosts than are small specimens. The eggs of *Pachysphinx modesta* (Harris) which have a chorion 28 microns in thickness are readily parasitized by the large specimens of *Trichogramma* but are immune to parasitism by small specimens. On the other hand, large specimens tend to ignore hosts of less volume than their own bodies. Solitary specimens from *Estigmene* eggs confined with *Sitotroga* eggs did not oviposit although their parents were reared from *Sitotroga* eggs.

The largest number of adults obtained from one *Pachysphinx* egg was 50, although the maximum number dissected from one egg was 75. When the largest possible number of progeny develop in a single host, they attain the minimum in size. The thick shell of the *Pachysphinx* egg is so resistant that in most cases the small parasites were unable to cut their way out.

REFERENCES

- Peterson, A., Jour. Econ. Ent., 24:1070-1074, 1931.
Schread, J. C., and P. Garman, Conn. Agr. Exp. Sta., Bul. 353:691-756, 1931.

A NOTE ON ELASMOSTETHUS

In the Proceedings of the Entomological Society of Washington, xxxiv, p. 65, 1934, Mr. H. G. Barber sinks my *Acanthosoma cruciata cooleyi* as a synonym of *interstinctus* Linn. (syn. *dentatus* DeGeer). *Elasmostethus cooleyi* is actually a quite distinct species from either *cruciata* or *interstinctus*. My specimens of *dentatus* were received from M. Lethierry many years ago and were in good condition, having the brush of stiff bristles well developed. My statement in the original description of *cooleyi* that "in *dentatus* this sinus is indicated only by a small black tooth on either side" did not mean that this sinus was without the brush of stiff hairs as Mr. Barber seems to have interpreted it.—E. P. Van Duzee.